DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Steve

Date July 7, 1992

From Robert E. Safay
ATSDR Regional Representative

Subject Initial Release Public Health Assessment
Kalama Specialty, Burton, Buford County, SC

To Jan Rogers, Chief, South Carolina Remedial Section

Attached for Environmental Protection Agency and South Carolina Department of Health and Environmental Control (SCDHEC) review and comments is a copy of the Agency for Toxic Substances and Disease Registry/ SCDHEC Draft Initial Release Health Assessments for the referenced facility. Please feel free to either respond to me with your comments via a memo or marked up copy.

If possible, please attempt to return comments to me by July 22. Should you have any questions please call me at 404-347-1586.

Robert E. Safay

Robert E. Safay

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Public Health Assessment for

KALAMA SPECIALTY

BURTON, BEAUFORT COUNTY, SOUTH CAROLINA

CERCLIS NO. SCD094995503

JUNE 17, 1992

JULY 22, 1992

THE ATSDR HEALTH ASSESSMENT : A NOTE OF EXPLAINATION

Section 104 (i) (6) (F) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states"...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

PUBLIC HEALTH ASSESSMENT

KALAMA SPECIALTY

BURTON, BEAUFORT COUNTY, BEAUFORT, SOUTH CAROLINA

CERCLIC NO. SCD094995503

Prepared By

The South Carolina Department of Health and Environmental Control (SCDHEC)
Under Cooperative Agreement with the
Agency For Toxic Substances And Disease Registry

INITIAL RELEASE

Steve,
Were these things
done in the RI
and therefore is
the summary somewhat
out of context to what
has occurred to date.
JBR

Kalama Specialty Chemicals, [illegible] hemical
manufacturing plant located [illegible] C. The
Environmental Protection Ag[illegible] to the
National Priorities List (NP[illegible] sult of
chemical contamination of soi[illegible] minants
of concern include benz[illegible] 1,2-
dichloroethane, 1,1-dichloroe[illegible] oride,
lead, mercury, and sodium. Th[illegible] y Vega
Chemicals from 1973 to 197[illegible] custom
manufacturer of hydrogenated [illegible] other
specialty chemical products. [illegible] emical
wastewater in an unlined lagoo[illegible] underground
tile field.

KSCI purchased an interest in Vega Chemicals in 1976 and acquired the facility (16-acre site) two years later. The site was adjacent to a 34-acre tract that contained a mobile home park. KSCI eventually acquired the 34-acre tract as well, but confined their chemical manufacturing to the original 16-acre site.

In January 1979, following a fire and explosion, KSCI released a number of organic and inorganic chemicals into the environment. KSCI remained in operation until 1983 when the plant closed down. EPA and the South Carolina Department of Health and Environmental Control (SCDHEC) have been investigating this site to better characterize the impact of environmental contamination on soil and groundwater.

There are no completed pathways of exposure at this time. However, exposure of human population to contaminated soil or groundwater could result in a potential pathway through ingestion, inhalation or dermal absorption.

We classify this site as an indeterminate health hazard, because soil and groundwater contamination has not been fully-characterized.

We recommend the following: the site be secured to minimize exposures to the public; restrict future development of the site area; further sampling be conducted at private wells to determine the potential for future contamination; further sampling be conducted for ambient air quality, surface and subsurface soil both on-site and off-site, and that more information be obtained on private well usage.

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BACKGROUND

A. Site Description and History

Kalama Specialty Chemicals, Inc. (KSCI) site is located approximately 4 miles northwest of Beaufort, S.C. on Highway 21 (Figures 1 and 2). The site coordinates are 32°28′ 24″ north latitude and 80°44′ 25″ west longitude. The total area of the site is approximately 50 acres. The site consists of a 34-acre former mobile home park in the northern portion and in the southern part a 16-acre tract which was originally owned by Vega Chemicals (Figure 3). KSCI purchased the 16-acre tract, then known as Vega Chemicals (Vega), from the Beaufort County Development Association in 1978 and the mobile home park from a private owner in 1980. KSCI confined its operations only in 16-acre tract and conducted no operations on the mobile home park property. Two abandoned sanitary oxidation ponds (pond 1 and pond 2, Figure 3) located in the mobile home park area had been used to receive sanitary wastewater from the mobile homes.

The site is bounded on the west by the Seaboard Coast Line Railroad and on the east by US Highway 21. The U.S. Marine Corps Air Station (MCAS) is adjacent to the plant on the opposite side of U.S. Highway 21.

Vega first leased the 16-acre facility from the Beaufort County Development Corporation in 1973 for custom chemical formulation operations. They treated process wastewater in an unlined lagoon and tile field system (a trench filled with rock and pipe that functions to disperse waste from a septic tank). From 1977 to 1978, Vega repackaged a large quantity of phosphorus oxychloride and discharged the rinse water (used to clean the empty product containers) into the wastewater lagoon.

KSCI purchased an interest in Vega in 1976 and acquired the balance of the company in 1978. An explosion and fire at the operation area (the area surrounding the reactor pad and unlined lagoon, Figure 3) in January 1979 released organic and inorganic chemicals into the environment. During the fire-fighting effort, contaminated water ran off of the operations area along the fire break road (Figure 3) and along a small dirt road from the operations area toward north into the adjacent mobile home park's property.

After KSCI ceased operations at the site in 1983, the site was leased by a construction firm for storage of preserved timbers, oil tanks, and waste concrete from the U.S. Marine Corps Air Station at Beaufort. The construction firm conducted these storage activities from 1986 to 1989.

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The South Carolina Department of Health and Environmental Control (SCDHEC) first began investigating the site in 1976 by inspecting the operation of the wastewater lagoon and the tile field within the KSCI area. The State and KSCI continued to investigate the site through groundwater, soil, and surface water sampling.

In September 1984, United State Environmental Protection Agency (EPA) placed the Kalama site on the National Priorities List (NPL) through a Hazard Ranking System (HRS) as a result of the presence of organic compounds and heavy metals in soil and the groundwater beneath the site. In 1988, the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a Preliminary Health Assessment for the site.

Post, Buckley, Schuh & Jernigan, Inc. (PBS&J), has been conducting a Remedial Investigation (RI) for the site since July 1989. The RI is one of the early phases of the EPA's remedial process at a NPL site. The purpose of the RI is to characterize the site and the site contamination. Major activities involved in a RI include site characteristics (site geology, hydrology, demographics and environment) investigation, environmental sample (soil, air, sediments, groundwater and surface water samples) collection and sample analysis. Information obtained during the RI enables us to determine contaminants at the site, contamination source(s) and potential contamination migration. The information provides a basis for the technical design of the site remediation.

PBS&J performed the first phase of field work during July 1989 and December 1990 and additional field work from September to November 1991. The data that we used in this public health assessment is mainly from the RI report dated December 1991.

B. Site Visit

Mr. Doug Blansit, SCDHEC project staff, visited the Kalama site on October 30, 1990. Mr. Doug Blansit and Ms. Yanqing Mo both visited the site on July 2, 1991.

The 50-acre site area is relatively flat with 8 feet of total relief (Figure 3). Topographically, the ground surface slopes slightly toward the southwest. The 16-acre tract is a broad open area covered with grass and bushes. Two lagoons at the KSCI area used by Vega and KSCI were removed of waste materials and backfilled with clean soils in 1983. They are currently not recognizable. The operations area is surrounded by an 8-foot high chain-link fence. We observed an opening on the north side of the fence during the 1990 site visit that had been repaired as of the 1991 visit.

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The former mobile home park portion of the site is now a heavily wooded area. An "L"-shaped ditch located in the center of the park is approximately 3 feet wide, 2-6 feet deep and approximately 1,600 feet long (Figure 3). During the 1991 visit, we observed standing water in the ditch to an approximate depth of 1 foot. The ditch and the pond 1 are both hidden within heavy woods and not easily observable from small paths nearby. The pond 2 is in an open area. Both pond 1 and pond 2 are enclosed by 8-foot high chain-link fences.

We observed shotgun shells and tracks of small animals during both visits and we also noticed bicycle tracks during the 1990 visit. We located a number of monitoring wells during the 1991 visit that appeared to be in good condition.

C. Demographics, Land Use, and Natural Resources

Demographics

The Kalama site is located on Port Royal Island within 5 miles of both the cities of Beaufort and Port Royal in Beaufort County. Beaufort County is one of the fastest growing counties in the state of South Carolina. The combined area of Beaufort County is 579 square miles with a 1990 population estimate of 86,425 persons (U.S. Bureau of the Census, 1990). This ratio gives Beaufort County a substantially higher population density than the surrounding counties.

The U.S. Marine Corps Air Station is located approximately 1 mile to the east of Kalama. The 1990 resident population at the Air Station was approximately 1,257 persons (U.S. Bureau of the Census, 1990)

At the time of the 1990 Census, an estimated 2,550 persons lived within a 2-mile radius of the site. A total of 480 persons lived within a mile (Table 1). The nearest residence is approximately 100 yards north of the site. The remainder of the residences in the area are 1,000 feet or more from the site. The population density surrounding the site is predominantly to the north and northwest. There is a Day Care Center approximately 0.25 mile south of the site.

The population within a 1-mile radius of the site is 41% white, 57% black, and 2% other. Within the 2-mile radius the population is 43% white, 55% black, and 2% other. Approximately 8% of the population within 1 mile are 10 years old or younger and 5% are 65 years old or older. This changes in the 2-mile radius to 21% being 10 years old or younger and remains at 5% being 65 years old or older (Table 1).

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Residential housing in the area consists primarily of single family units and a number of mobile homes. The census for this area indicate middle income households. About 6% of owner-occupied housing is worth less than $25,000 in 1990, while 23% of renter-occupied units were under $150 per month. The figures for renter-occupied units include subsidized housing of those who pay no cash rent.

Land Use

The site is zoned commercial and the surrounding property is a combination of residential, commercial, industrial, agricultural, and military development. The area is sparsely to moderately populated with residences located to the north and northwest, and in a large 1,000-unit housing development at Laurel Bay 2.5 miles to the southwest.

Within 2 miles of the site, there are several other sites and facilities. Independent Nail Company and Wamchem Inc., both NPL sites, are located to the southwest and northwest of the Kalama site, respectively. The abandoned Beaufort County landfill is also located to the southwest of the site, approximately 1,000 feet to the west of the Independent Nail Company. Across US Highway 21 to the east is the Marine Corps Air Station (MCAS), which has a history of fuel spills. Also, Venture Chemical, located to the north in Lobeco, is an active chemical facility within 2 miles of the site.

Natural Resources

The site is located on a recharge area for the Floridan aquifer. The subsurface of the site is divided into a water table aquifer and a underlying limestone aquifer, which is part of the Floridan Aquifer. The limestone aquifer provides over 80 percent of the groundwater for the Low Country of South Carolina (Hampton, Colleton, Jasper and Beaufort Counties). The businesses and residences in this area are served by the Beaufort-Jasper Water Authority, however, many houses are not connected to the water lines and use private wells. Six non-public water supply wells (CW, CW-PROD, CW-DRINK, GR, MAS and MASL) are shown in Figure 6. Wells CW and CW-PROD are production wells used by a concrete plant. CW-DRINK provides potable water for the employees of the plant. GR is a residential well, and wells MAS and MASL are located within MCAS property. Currently, we can not find any information regarding water usage of wells GR, MAS and MASL.

Forest borders the site on three sides and may provide an environment for wildlife, a source of lumber or pulpwood production, and a location for recreational hunting.

D. State and Local Health Data

We contacted the SCDHEC District Health office in September 1991 and they indicated that no studies had been initiated as a result of public concerns regarding this site. Relevant health outcome data were not available for review because no one is exposed and no community health concerns exist.

COMMUNITY HEALTH CONCERNS

We found no indications of specific community health concerns through file review and discussion with the SCDHEC district health officers. Complaints listed in the SCDHEC files for Vega/KSCI relate to "noxious odors" emanating from the site. We could not locate any specific, descriptive terms in the files to further describe the odors. These complaints are sporadic, relatively few in number, and can be traced back to when Vega first began operating in 1973, up until the time that KSCI closed the site in 1983. We found no complaints related to other media (surface water, soil or groundwater) and no specific information about health concerns indicated in the files reviewed. Local health officials from the Beaufort County Health Department (BCHD) stated in September 1991 that there were no current community complaints. BCHD has no records of previous clinic visits resulting from complaints of exposure to contaminants at KSCI. We searched files from both SCDHEC Wastewater and Emergency Response divisions, finding only anecdotal references to odor complaints. SCDHEC personnel conducted several site inspections from 1976 to 1979, and in 1988, to investigate the operation of the wastewater holding pond and in response to complaints regarding odors. PBS&J performed a surface water sampling in 1979. Neither SCDHEC nor PBS&J could determine a cause for the odors.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

In gathering environmental monitoring information for the Remedial Investigation, PBS&J collected environmental samples from soil, surface water, sediment and groundwater (Figures 4, 5 and 6). Soil samples were collected only in on-site locations during sampling events in July 1989, March 1990 and September to October 1991. Groundwater samples were obtained in on-site and off-site areas during four sampling rounds: October 1989, December 1989, February 1990 and October 1991. In the same four sampling rounds plus another sampling event in November 1991, surface water and sediment samples were collected from the L-shaped ditch at both on-site and off-site portions. All samples were analyzed for organic and inorganic compounds.

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Groundwater samples were obtained from monitoring wells, local residential wells and industrial wells. Monitoring wells were installed within the water table aquifer (designated as MW wells) and the limestone aquifer at a depth of approximate 100 feet (LW wells). Water table wells were completed at several depths: approximate 10, 25, 30, 40, 60 and 80 feet. Monitoring wells can be constructed as a single well or a well cluster. A well cluster contains more than one well. At the Kalama site as seen in the Figure 6, a well cluster contains 2 or 3 wells and is designated as, for instance, MW-46,A,B, with MW-46 be the deepest well and MW-46B the shallowest well. Based on groundwater flow patterns, historical sampling results and potential contamination source areas, PBS&J selected, with consent of the EPA and SCDHEC, 53 monitoring wells, 3 industrial wells (CW, CW-DRINK and CW-PROD) and 3 residential wells (GR, MAS and MASL) to obtain groundwater samples during the Remedial Investigation (Figure 6).

TOXIC RELEASE INVENTORY (TRI)

We searched for Toxic Chemical Release Inventory data for the area within a 1-mile radius of the Kalama site using both geographic coordinates and area zip codes.

The Toxic Chemical Release Inventory (TRI) is a database managed by the EPA since 1987. The inventory contains information on the annual estimated releases of over 300 toxic chemicals into the environment (air, water and land) by industry.

Mandated by federal regulations, Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986, facilities with 10 or more full-time employees are required to report to the EPA on releases of any of those 300 toxic chemicals during their business activities. Based on these reports, a database has been established and continuously been updated annually. The database records the names and addresses of facilities which manufacture, process, or use these toxic chemicals, as well as amounts released to environment or transferred to waste sites.

The TRI data search showed the database contained no records on the release of toxic substances by operating facilities in the Kalama site area. However, the TRI database does not completely cover all toxic substances used in this area, especially those used by some companies that terminated their operations before the existence of the TRI program, such as KSCI. Table 2 shows the raw materials and products handled at the site from 1976-1983.

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A. On-Site Contamination

Air:

No ambient air samples were taken in the on-site area.

Soil:

Two common methods can be employed to obtain a soil sample: discrete or composited method. In the discrete method, a sample is obtained from a single depth at one location. While a composited sample is a mixture of several samples collected either from several different depths at a single location (depth-composition), from the same depth at multi-locations (location-composition), or from multi-depths at different locations (full-composition). The discrete and both depth-composition and location-composition methods were used to collect soil samples during the RI at the Kalama site.

A total of 85 soil samples were collected in four sampling rounds during the RI. Seventeen of the 85 samples were obtained from the depth interval of 0 to 12 inches with depth-composition method. Another 26 location-composition samples were collected from grid A at depths of 1 and 3 feet, and from each grid of grids B through I at depths of 1, 3 and 5 feet (Figures 4 and 5). The rest are all discrete samples collected from subsurface at shallow depths between 1 and 6 feet below the ground surface. No soil samples were taken from the depth of 0-3 inches.

Six subsurface soil samples (Grids A and B, B5A, 2P6, 2P7 and 2P13) contained more detectable organic compounds and higher concentrations ranging from 1 - 1,000,000 microgram per kilogram (ug/kg). Four samples (D-5, F-5, 2P2 and 2P16) showed no contaminations and 18 samples only have a few compounds detected at levels lower than detection limits (J values). The rest 57 samples were detected at low levels of organic contaminants ranging from J values to 100 ug/kg. Samples 2P15 and 2P16 detected mercury at levels 5.11 ug/kg and 94.68 ug/kg, and E-3 detected lead of 494.85 ug/kg, respectively, which exceed the highest level observed in the eastern United States. Another 18 samples contains mercury and 8 samples detected lead at levels exceeding the mean level observed in the eastern United States.

Shallow subsurface soils in the area immediately west of the operator pad and north of the tile field (B5A, grids A and B, Figure 4) contained the highest contamination with several organic compounds including benzene, 1,2-dichloroethane, ethylbenzene and methylene chloride. Elevated levels of lead and mercury were also detected in the vicinity of the operations area (Table 3). Soil samples from various areas across the site detected less compounds and lower concentrations.

In general, concentrations of organic compounds detected at depth interval of 0 to 12 inches were lower, but levels of mercury and lead are generally higher than the respective concentrations detected in the samples obtained from depths greater than 1 foot. Contamination also decreases with increasing distances from the vicinity of the operations area.

Groundwater:

A total 78 groundwater samples were collected at on-site locations from 38 monitoring wells during four sampling rounds. Samples were analyzed for both organic and inorganic compounds. Samples for metal analyses were non-filtered as required by the EPA.

Organic compounds detected in higher concentrations and most widely distributed in the groundwater include benzene, 1,2-dichloroethane, 1,1-dichloroethylene, ethylbenzene, and methylene chloride (Table 3). The highest concentrations of up to and greater than ten thousand ug/L were observed in well cluster MW-46,A,B. Contaminants at levels up to several hundred ug/L were also detected in wells MW-51 and MW-49 located north and northwest of the operations area (Figure 6). Samples from other wells contained less compounds at lower levels. Methylene chloride, acetone, 1,2-dichloroethane were also detected at concentrations lower than 100 ug/L in samples obtained from limestone wells.

Elevated levels of lead and mercury were also detected in a few groundwater samples collected from monitoring wells in the vicinity of the operations area.

Analytical data indicate that more contaminants with higher concentrations are distributed in the water table aquifer in areas north and northwest of the operations area. Generally, contamination decreases with increasing depths and increasing distances from the operations area.

Surface Water and Sediments:

In 1987, KSCI sampled surface waters from two locations in the L-shaped ditch, two oxidation ponds in the former mobile home park, and a wet weather depression in KSCI property (Figure 6). Several volatile organic compounds (VOCs) including benzene (11-86 microgram per liter (ug/L)), toluene (12-35 ug/L), ethylbenzene (38 ug/L) and 1,2-dichloroethane (19-174 ug/L) were detected in samples from the ditch. No VOCs were detected in both pond samples. No information was available regarding the quality of the samples from the wet weather depression.

In an effort to assess the source of odors that were detected near the L-shaped ditch, SCDHEC collected surface water samples from the ditch in 1988. Benzene and 1,2-dichloroethane were detected in the samples at levels of 6.6 ug/L and 50.4 ug/L, respectively. These levels were considered insufficient to account for the odors.

During the five sampling events conducted through October 1990 to November 1991 for the Remedial Investigation, PBS&J collected five surface water samples (SW-1 through 5) and two sediment samples (SD-2 and SD-3, same locations as SW-2 and SW-3 in Figure 6) from the ditch in the former trailer park. Sampling results indicate the presence of several organic compounds and elevated levels of lead and mercury. The highest concentrations occurred in the surface water sample SW-2 and the sediment sample SD-2 (Table 3).

B. Off-Site Contamination

Air and Soil:

PBS&J did not collect air or soil samples from off-site areas during the RI.

Groundwater:

During the Remedial Investigation, PBS&J collected 40 groundwater samples in total from fifteen off-site monitoring wells and six local wells located to the north (well GR), east (MASL and MAB) and southwest (CW, CW-PROD and CW-DRINK). Organic compound 1,2-dichloroethane was detected at 10 ug/L in well CW (December 1989) and at 31 ug/L in well CW-PROD (October 1991) (Figure 6). No organic compounds or elevated metals were detected in well CW-DRINK. Wells CW and CW-PROD are screened in the limestone aquifer and are located approximately 700 feet to the southwest from well cluster MW-46, from which the highest levels of groundwater contamination were detected. Groundwater flow within the limestone aquifer beneath the site is toward southwest as indicated by water level measurements during the RI. Therefore, the presence of 1,2-DCA at these two wells may be the result of contaminant migration from the site.

Low levels of acetone (ND-170 ug/L) and methylene chloride (ND-14 ug/L) were detected at several off-site monitoring wells and local wells. However, these two compounds were also detected in the associated laboratory blanks. Therefore, the detection of acetone and methylene chloride in off-site groundwater samples may be attributed to laboratory contamination.

C. Quality Assurance and Quality Control

PBS&J conducted field work and sampling activities under Standard Operating Procedures (SOP) approved by EPA. All the samples were analyzed by Ecoter LSI, a member of the EPA Contract Laboratory Program (CLP). SOP and CLP are some standard procedures that are developed by EPA. These procedures are required to be employed in all environmental investigation activities to ensure that samples are collected and analyzed correctly and in good quality. SCDHEC assumes that adequate quality assurance and quality control measures were followed with regard to chain of custody, laboratory procedures, and data reporting.

Results of the analytical data present fair consistency between different sampling rounds and different media. However, high quantitation limits for benzene, carbon tetrachloride, 1,1-dichloroethene, ethylbenzene (500 ug/L), and vinyl chloride (1,000 ug/L), utilized to groundwater sample MW-46A may mask the possible presence of those compounds in the sample. The similar situation was also found in soil and sediment sample analyses.

Also, the frequent occurrences of acetone, methylene chloride and bis(2-ethylhexyl)phthalate in both blanks and samples indicate the possible existence of laboratory contamination.

D. Physical and Other Hazards

The ditch in the former mobile home park that is not fenced and the abandoned old operation house present a physical hazard. People who enter the site may fall into the ditch or the hole in the floor of the operation house.

Pathways Analyses

To determine whether nearby residents are exposed to contaminants migrating from the site, ATSDR and SCDHEC evaluate the environmental and human components (exposure pathway or pathway) that lead to human exposure. This pathways analysis consists of five elements: a source of contamination, an environmental medium through which a contaminant transport, a point of human exposure, a route of human exposure, and an exposed receptor population.

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ATSDR and SCDHEC categorize an exposure pathway as a completed or potential pathway if the exposure pathway cannot be eliminated. Completed pathways require that the five elements exist and indicate that exposure to a contaminant has occurred in the past, is currently occurring, or will occur in the future. Potential pathways, however, require that at least one of five elements is missing, but could exist. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present. Table 4 summarizes the potential exposure pathways that exist at the Kalama site.

A. Completed Exposure Pathway

Because we could not define a receptor population, we do not believe that exposure has occurred (past, present) or will occur (future). Therefore, no completed exposure pathways exist at this time. We will reevaluate this situation when further information becomes available.

B. Potential Exposure Pathways

Soil Ingestion Pathway

Due to the contamination of on-site soil and the accessibility of the site, people who worked on the site previously may have had exposure. People who enter the site for any reason have the potential for exposure to the soil through ingestion. We feel that the likelihood of contact with on-site soil contaminants is minimal because the site is vegetated. Frequent trespass onto the site is unlikely because the access to the site is restricted by the wooded area partially surrounding the site.

Because the site is covered with vegetation and partially surrounded by woods, wind effect is not evident. Therefore, exposure to the on-site contaminants through inhalation is not a concern at present time. Since soil contamination was also detected outside of the fence and free access to the site is available, the possibility of present and future exposure still exists. In particular, if future commercial or residential development of the property occurs, this possibility will largely increase.

Sediment Ingestion and Dermal Contact Pathways

Contaminated sediments detected in the ditch in the former mobile home park area present a potential for exposure through ingestion and skin contact to the people who enter the site and/or the ditch. However, we do not consider this to be a high probability.

Groundwater Inhalation and Dermal Contact Pathways

Contaminant 1,2-DCA has been detected in wells CW and CW-PROD. Because these wells are only used for production purpose by the concrete company and not as a drinking water supply, exposure through ingestion should not occur. However, the possibility of exposure through inhalation of 1,2-DCA vapors and through skin contact may exist.

We have no data to confirm that exposure exists; therefore, exposure is only likely to occur if the following conditions are met:

1. The use of contaminated groundwater occurs in an open system that allows the contaminant to evaporate to air.

2. The operation occurs in an enclosed environment. (operations that occur in outdoor environments are unlikely to lead to significant exposure.)

3. Operations that involve spraying of groundwater will lead to larger amounts of the contaminants evaporating from the groundwater than operations that involve a stream of water.

Surface Water Accidental Ingestion and Dermal Contact Pathways

Several contaminants have been detected in the surface water samples collected from the L-shaped ditch (Table 3). The ditch ultimately connects with a state highway drainage ditch and is not directly connected with a classified water body of the State. Because the ditch is not utilized for drinking water supplies, agricultural, industrial, or recreational purposes, the only potential for public exposure to the contaminated surface water would be through accidental ingestion and skin contact. This would include people who enter the site and fall into the ditch or for children who play in the ditch.

Public Health Implications

A. Toxicological Evaluation

In this section we will discuss the health effects in persons exposed to specific contaminants, evaluate state and local health databases, and address specific community health concerns.

To evaluate health effects, ATSDR has developed a Minimal Risk Level (MRL) for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily human exposure to the respective contaminant below which non-cancer, adverse health effects are unlikely to occur. MRLs are developed for each route of exposure, ingestion, inhalation and dermal contact, and for three different lengths of exposure, acute (less than 14 days), intermediate (15 to 365 days) and chronic (greater than 365 days). ATSDR presents these MRLs in Toxicologic Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status.

At the KSCI, currently available data show no completed pathways to be occurring at the present time. The only exception is that trespassers to the site may be exposed to contaminants for limited periods of time via ingestion of on-site surface soil. Because trespassers tend to be at the site for only short periods of time, we would expect their exposure to contaminated soil from the site to present a very small dose. Additionally, except for a few "hot spots" (B5A, grids A and B, 2P6, 2P7 and 2P13) soil contamination concentrations across the site are generally low (lower than 250 ug/kg), that further decreases the likelihood and severity of exposure.

The spread of contaminated ground water and/or the residential development of this property could lead to exposure in the future. If future residential development is not restricted, children may be exposed to contaminated surface water and sediment. Therefore, this section explains the health implications of ingesting contaminants at the maximum concentrations detected in soil, groundwater, surface water and sediments. Because this is a hypothetical exposure based on assumptions of groundwater movement and human activities at the site, the discussion is brief.

We will use standard assumptions in this section: an adult weighs 70 kilograms (kg) (154 pounds) and a child weighs 10 kg (22 pounds); an adult drinks 2 liters of water per day (the same as a 2-liter soda bottle) and a child drinks 1 liter per day; during a day, an adult may ingest as much as 100 milligram (mg) of soil. Because children commonly place hands and other objects in their mouths, they are likely to ingest more soil, typically around 200 mg. However, some children and adults intentionally eat soil. This phenomenon is called pica. ATSDR assumes that such persons with soil pica behavior ingest 5,000 mg of soil per day.

BENZENE

Benzene is a naturally occurring substance produced by volcanoes and forest fires and present in many plants and animals. It is also a major industrial chemical made from coal and oil and is found in gasoline, adhesives, household cleaning products, and art supplies.

No current human exposure pathway exists, therefore no adverse health effects are occurring at the present time. However, two pathways could occur in the future.

If the contaminated groundwater migrates off site and reaches private wells, ingestion of groundwater from those wells could lead to doses of benzene approximately five times EPA's 1-day and 10-day Health Advisories. ATSDR was unable to develop acute, intermediate, and chronic MRLs for benzene because insufficient human and animal data exist to allow us to determine a safe level of exposure for non-cancerous health effects. ATSDR does have a Draft Toxicological Profile for Benzene that was updated in October 1991. Doses approximately twenty-times greater have led to detrimental changes in the blood of exposed rats. The potential doses from other routes of exposure are much less and should not produce these effects.

Exposure to benzene has been associated with the development of cancer in both humans and laboratory animals. The lifetime (70 years) ingestion of maximally contaminated groundwater would lead to an anticipated moderate increased risk of developing cancer. Doses received from other media would contribute much lower doses and could increase this risk by lower amounts.

CARBON TETRACHLORIDE

Carbon Tetrachloride is used to make refrigerant fluids and propellants for aerosol cans. In the past, it has been widely used as a cleaning fluid, spot remover and grain fumigant.

No human exposure pathway exists for this compound at the present time. Additionally, any future scenario will not result in doses of this compound which will produce adverse health effects. Because of the current isolation of this site and the wide variation in the detected concentrations of this compound, we will not comment on the potential of this compound to produce a very low risk of developing cancer.

1,2-DICHLOROETHANE

1,2-Dichloroethane is a clear liquid that is not found naturally in the environment. It is used to make other chemicals. It is also used in several solvents. It has formerly been a component of some pesticides.

Currently, no exposure pathway exists for this chemical. Therefore, no adverse health effects are anticipated at the present time.

The ingestion of 1,2-dichloroethane from private wells at the highest levels found in on-site groundwater would not cause adverse, non-cancerous health effects in an adult. There would be an increased cancer risk. The maximum concentration of 1,2-dichloroethane in groundwater is six times EPA's longer-term health advisory for an adult. However, the theoretical, lifetime ingestion of maximally contaminated groundwater could lead to a highly significant risk of developing cancer.

For a child, the future ingestion of maximally contaminated groundwater could lead to health effects. In mice, similar oral doses have acutely caused a decreased immune response. Oral doses ten to twenty times greater have caused a decrease in the number of white blood cells, serious effects on the immune system, liver damage, and death.

1,1-DICHLOROETHYLENE

1,1-Dichloroethylene (DCE) is a chemical used to make other chemicals, such as some plastic wrap. Currently, no human exposure pathway exists for this chemical. Therefore, no adverse health effects are occurring.

In the future, the possible use of contaminated groundwater may lead to exposure. In this case, the maximum dose received by a child would be approximately four times the ATSDR's MRL. Because of the wide variance in contaminant concentrations and because of the safety factors used in deriving the MRL, this ingestion should not cause any adverse health effects.

Some evidence suggests that DCE may cause cancer in laboratory animals. EPA lists DCE as a possible human carcinogen. Because of the lack of human data, the paucity of animal data, and the lack of a plausible chronic exposure pathway, we cannot address the risk of cancer at this site from future exposures.

ETHYLBENZENE

Currently, no route of human exposure exists for this chemical. Therefore, no adverse health effects are anticipated at the present time.

Additionally, an infant with soil pica and ingesting maximally contaminated groundwater would receive a dose of ethylbenzene approximately ten times EPA's reference dose. ATSDR has a Toxicological Profile for Ethylbenzene but was unable to develop an oral MRL because toxicity information known about ethylbenzene was insufficient. The December 1990 Toxicological Profile indicates that little human and animal toxicity is available. Because of this lack of data, we will not consider ethylbenzene further at this time. However, from the limited animal data that was available, the most likely effects from exposure to ethylbenzene may be to the liver, kidney, and blood system. Because of the poor design of these animal studies, we cannot determine the level of exposure to ethylbenzene that results in adverse health effects in children exposed to ethylbenzene in soil and water.

METHYLENE CHLORIDE

Methylene chloride is a commonly used solvent and paint stripper. Because many laboratories commonly use methylene chloride, it often appears as a contaminant in laboratory samples. Because the laboratory also detected methylene chloride in the associated laboratory blanks, this Health Assessment cannot assess the possible future health effects which may result from this compound at the Kalama site.

VINYL CHLORIDE

Vinyl chloride is also known as monochloroethylene is mainly used to make polyvinyl chloride (PVC). PVC is used to manufacture a variety of plastic and vinyl products including pipes, wires and cable coatings, packaging materials, wall coverings and automotive parts.

Currently available data indicate that vinyl chloride was only found in the ditch sediments in limited areas. Even if a child with pica were to exclusively ingest these ditch sediments, the child would receive a dose of vinyl chloride equal to ATSDR's chronic MRL. Therefore no adverse health effects would be anticipated.

Because vinyl chloride appeared in a limited number of samples from only one specific medium, chronic exposure to this chemical appears highly unlikely. Therefore, carcinogenic effects will not be discussed here.

LEAD

Lead is a naturally occurring element found in most environmental media. It has a wide range of uses including storage batteries (automobile batteries), solders, pipes, various chemicals, and, formerly, gasoline additives.

Although lead may cause both acute and chronic effects, major concern has been focused on two chronic effects of lead toxicity. Chronic lead toxicity is associated with irreversible central nervous system and peripheral nervous system damage in children; it is also associated with hypertension in some adult males.

ATSDR has not set an MRL for lead nor has EPA set a reference dose for lead. Although exposure to certain lead salts have been associated with an increased rate of cancer in laboratory animals, EPA has not estimated the carcinogenic potency of lead. Because of recent evidence linking even low lead exposure to the effects listed above, EPA is expected to lower its limits for lead in both water and soil. Personal communications indicate that EPA will probably lower the soil limit to between 250,000 and 350,000 microgram per kilogram (ug/kg) and the limit for a water supply to 5 ug/L.

At Kalama, current exposure to lead is not currently of concern. Similarly, the lead levels are not of concern as long as the site remains vacant or industrial. However, if the site should become residential, the ingestion of lead from soil and possibly the limited ingestion of stream sediments would be of concern.

MERCURY

Mercury is a chemical element that occurs naturally in several forms. The most familiar is the silvery liquid metal used in some thermometers and other common products. Mercury also occurs in combination with other elements. One form of mercury, methylmercury, can accumulate in certain fish. Analyses at Kalama did not differentiate between organic and inorganic mercury. However, since the detected mercury was not associated with any living tissue, it is probably inorganic.

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The levels of mercury found at the site are not of concern unless the site should become residential in the future. Even then, the levels of mercury would be of concern for a young child with soil pica ingesting maximally contaminated soil. In this case, the child would receive a dose ten times the ATSDR's chronic MRL. Because testing did not show a widespread presence of mercury and because surface soil samples were not analyzed as part of the remedial investigation, the actual dose may be much less than "the worst case" models. Therefore, mercury will not be considered of concern at the present time.

SODIUM

In the earth sodium is commonly found combined with other elemental ions. Sodium and chloride form table salt. Sea water contains large amounts of sodium.

Because of medical conditions, some people need to limit their sodium intake. For example, some people with high blood pressure often benefit from a low salt diet.

B. Health Outcome Data Evaluation

No health outcome data were reviewed at this time because of a lack of community health concerns and because no plausible completed exposure pathway exists. Should site conditions change in the future, we will reevaluate this situation.

C. Community Health Concerns Evaluation

We did not interview anyone from the local community because we could not identify any community concerns. Should site conditions change, or should persons come forward with additional information, we will modify these conclusions.

CONCLUSIONS

We consider this site to be an indeterminate health hazard because of insufficient data on exposures to human populations to soil and groundwater contamination both on-site and off-site. This decision may change when further information becomes available. There are no completed pathways at present time; however, potential pathways should be monitored until the site has been remediated or made inaccessible to the public.

RECOMMENDATIONS

1. KSCI should restrict public access to the site to prevent trespassers, especially children, from becoming exposed to the contaminated on-site soil and surface water, the ditch and the abandoned house.

2. Additional and subsequent follow-up sampling is needed at the private wells in the vicinity of the site until the site is remediated in order to determine the potential for future contamination due to off-site migration of the contaminated groundwater.

3. KSCI should conduct air monitoring, off-site surface and subsurface soil sampling, and a detailed survey on private well and local groundwater usage in order to more accurately characterize contamination at the site.

4. Beaufort County should restrict future development of the site until the site is remediated.

5. Any persons on a "low salt" or "low sodium" diet should be cautious about consuming water from near this site.

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3. ATSDR, Toxicological Profile for Benzene, ATSDR/TP-88/03, May 1989.

4. ATSDR, Toxicological Profile for Carbon Tetrachloride, ATSDR/TP-89/05, December, 1989.

5. ATSDR, Toxicological Profile for 1,2-Dichloroethane, ATSDR/TP-90/10, December 1989.

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7. ATSDR, Toxicological Profile for Ethylbenzene, ATSDR/TP-90/02, December 1990.

8. ATSDR, Toxicological Profile for Lead, ATSDR/TP-88/17, June 1990.

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10. ATSDR, Toxicological Profile for Methylene Chloride, ATSDR/TP-88/18, April, 1989.

11. ATSDR, Toxicological Profile for Vinyl Chloride, ATSDR/TP-88/25, August 1989.

12. PBS&J, 1991. Remedial Investigation Report, Kalama Specialty Chemicals, Inc.

13. SCDHEC, Hydrology Division, 1979. Kalama (Vega) Chemical Company, Beaufort County, South Carolina, Ground-Water Contamination Investigation.

14. SCDHEC, Division of Hydrogeology, Superfund and Solid Waste Section, Section files on the Kalama Site.

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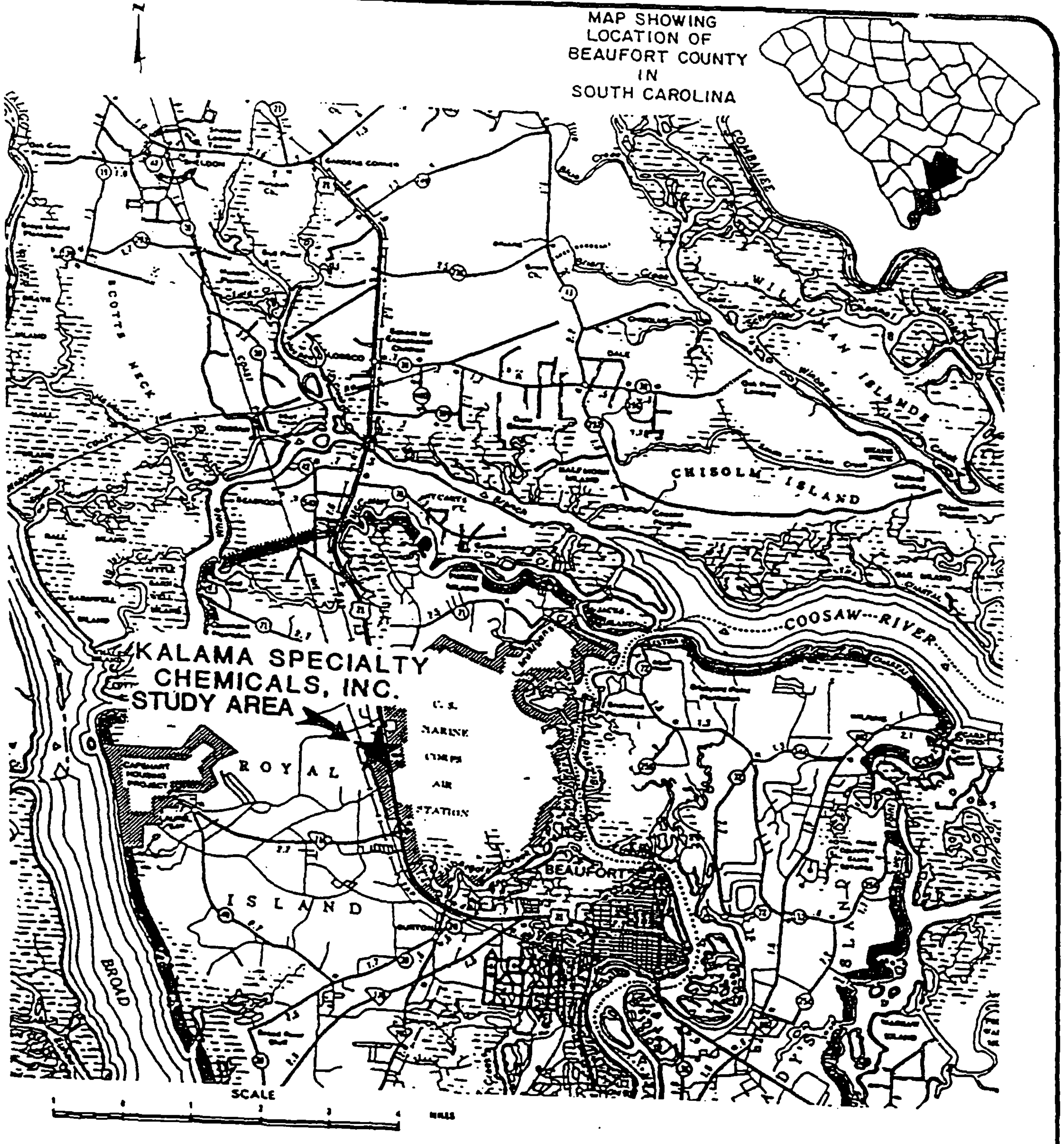
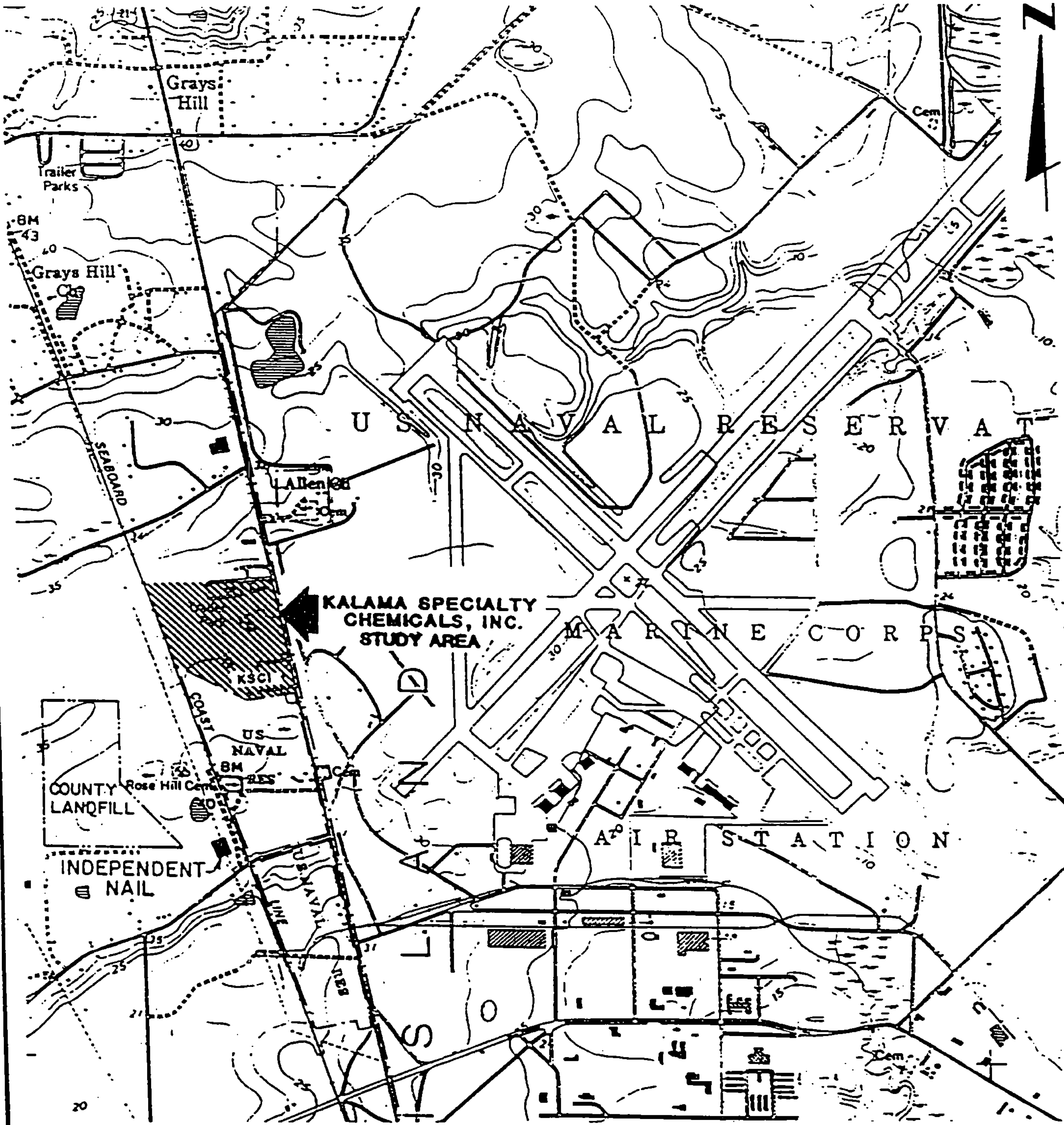


GENERAL LOCATION MAP

KALAMA SPECIALTY CHEMICALS, INC.
BEAUFORT, SOUTH CAROLINA

FIGURE
1



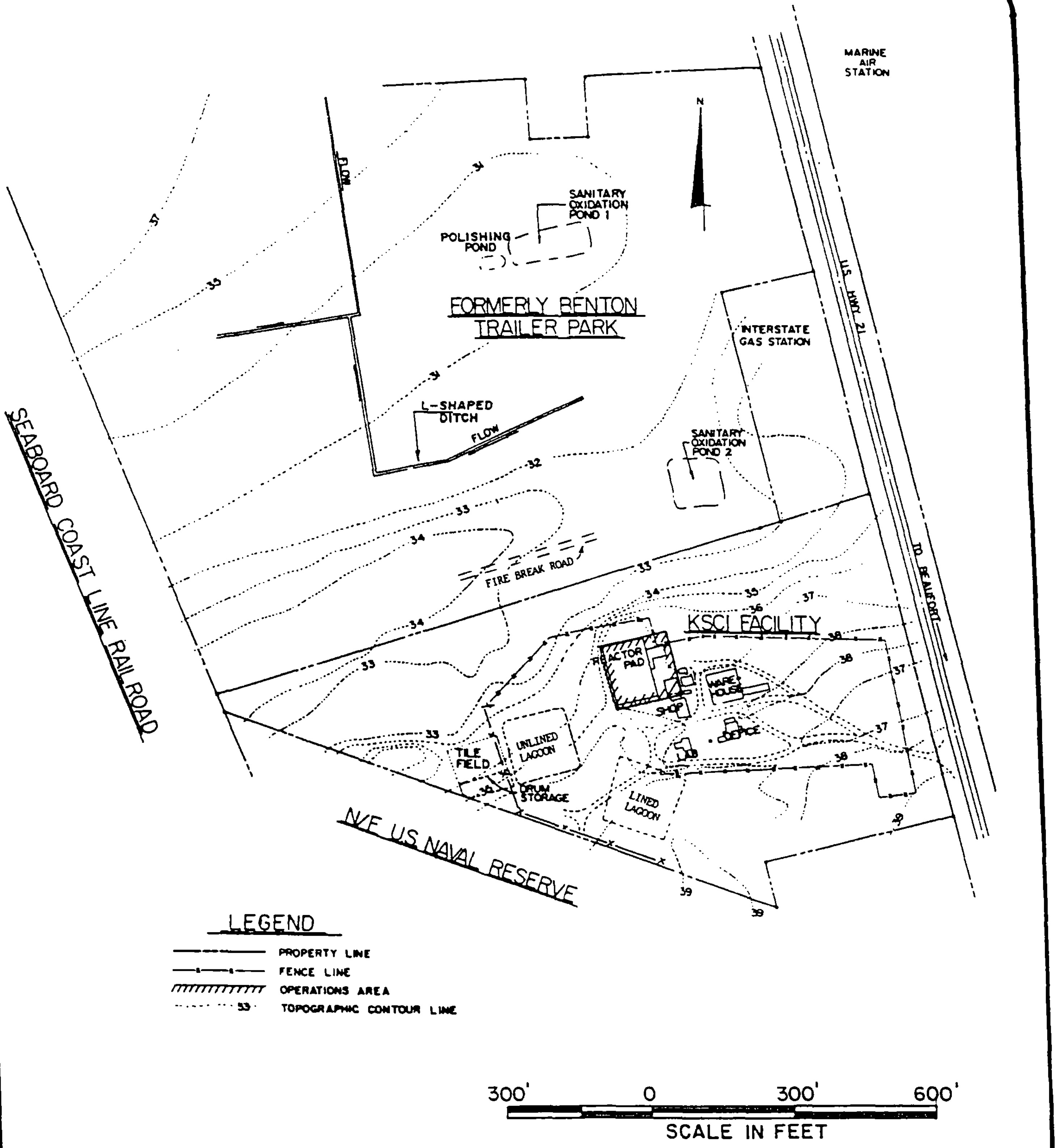
7.5 Minute Series (Topographic) Beaufort Quadrangle, SC

2000 0 1000
FEET

STUDY AREA LOCATION MAP

KALAMA SPECIALTY CHEMICALS, INC.
BEAUFORT, SOUTH CAROLINA

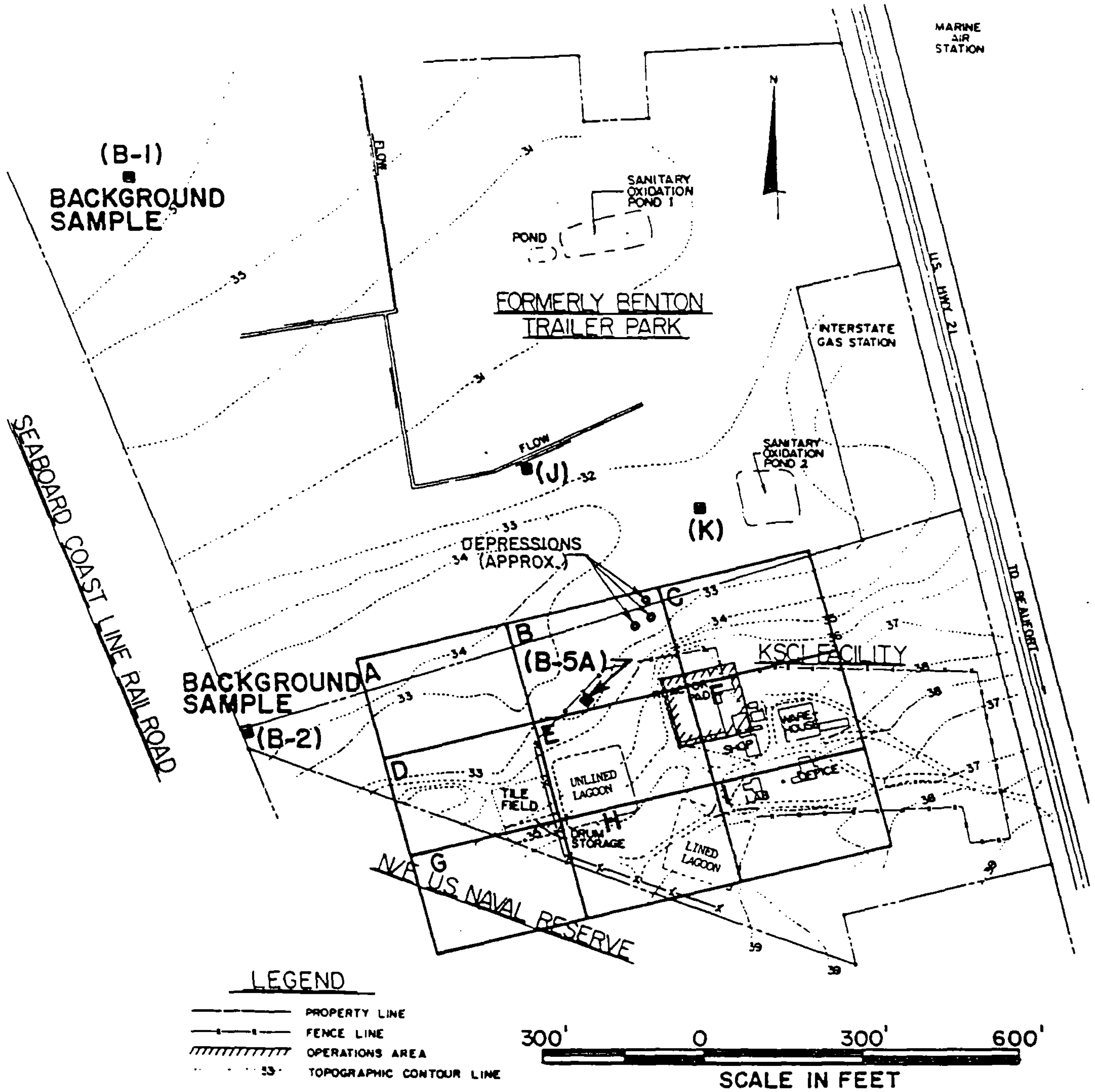
FIGURE 2



SITE MAP WITH TOPOGRAPHY

KALAMA SPECIALTY CHEMICALS, INC.
BEAUFORT, SOUTH CAROLINA

FIGURE 3

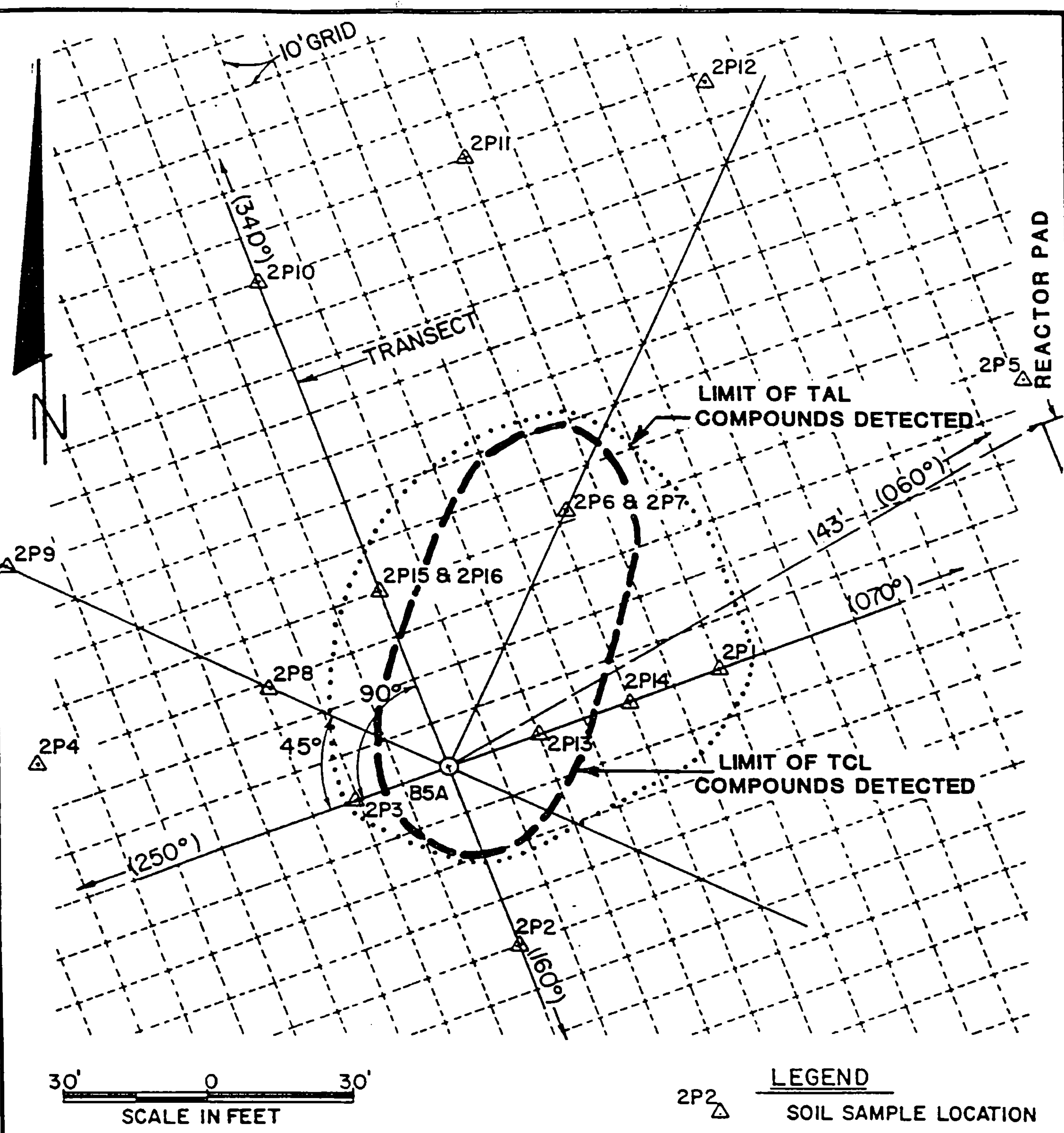


FACILITY MAP SHOWING SOIL SAMPLING LOCATIONS, JULY 1989

PBSJ

KALAMA SPECIALTY CHEMICALS, INC.
BEAUFORT, SOUTH CAROLINA

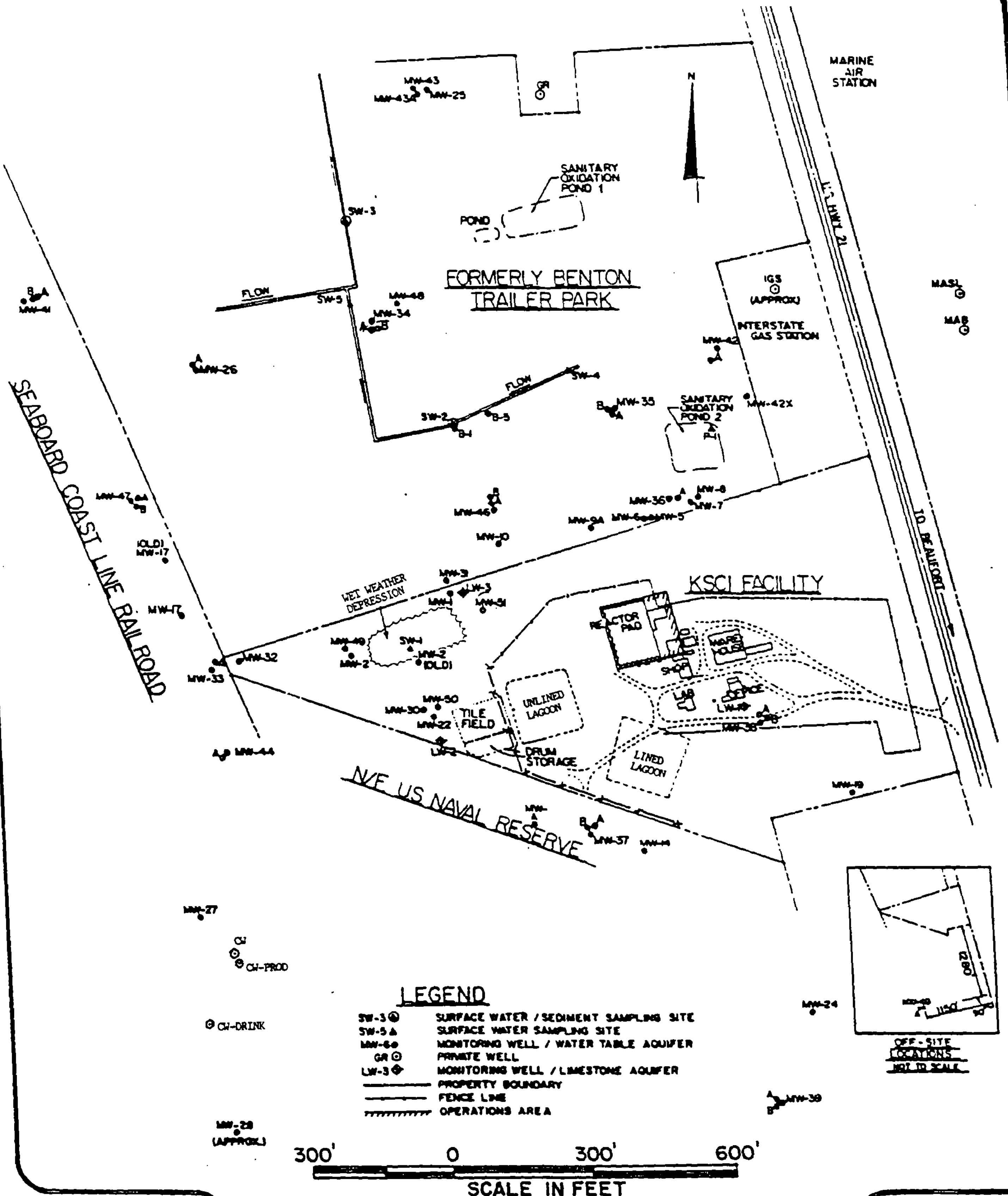
FIGURE 4



MARCH 1990 SECOND PHASE

SOIL SAMPLING LOCATIONS

PBS&J POST, BUCKLEY, SCHUH & JERNIGAN, INC. KALAMA SPECIALTY CHEMICALS, INC. STUDY AREA BEAUFORT, SOUTH CAROLINA	FIGURE 5 JOB No: 18-017.55



SITE MAP WITH MONITORING WELLS AND SAMPLING POINTS FOR SURFACE WATER AND SEDIMENTS

FIGURE 6

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Table 1
Kalama Specialty Chemical Demographics
1990 US CENSUS DATA

A*. Demographics for 1-mile radius
Total Population: 478
Median age: 25

B*. Demographics for 2-mile radius
Total Population: 2,550
Median age: 27

% White	% Black	% Other	% <10 yrs	% 65+ yrs	% Rental Units <$150/ month **	% Houses <$25,000	% Renter-Occupied
A* 41	57	2	8	5	39	5	51
B* 43	55	2	21	5	23	6	34

** Percentage include all rentals; some subsidized housing includes those who pay no cash rent.

C. Beaufort County
Total Population: 86,425

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TABLE 2

LIST OF KNOWN CHEMICALS USED IN OR ASSOCIATED WITH MANUFACTURING PROCESSES FROM 1976-1983
Kalama Site

Type Reaction	Final Product	Compound	Designation	Chemical Name
Hydrogenation	Dihydrosafrole	Dihydrosafrole	Product	Dihydrosafrole
		Safrole	Raw Material	Oil of Sassafras
		Hydrogen	Raw Material	Hydrogen
		Nickel	Catalyst	Raney Nickel Hydrogenation Catalyst
Hydrogenation	3-Amino Benzanilide	3-Amino Benzanilide	Product	3-Amino Benzanilide
		3-Nitro Benzanilide	Raw Material	3-Nitro Benzanilide
		Hydrogen	Raw Material	Hydrogen
		Nickel	Catalyst	Raney Nickel Hydrogenation Catalyst
Hydrogenation	Homomenthol	Homomenthol	Product	Homomenthol
		Isophorone	Raw Material	3,5,5-Trimethyl-2-cyclohexene-1-one
		Hydrogen	Raw Material	Hydrogen
		Nickel	Catalyst	Raney Nickel Hydrogenation Catalyst
Hydrogenation	Benzyl Alcohol	Benzyl Alcohol	Product	Phenyl methanol
		Benzaldehyde	Raw Material	Benzoic aldehyde
		Hydrogen	Raw Material	Hydrogen
		Toluene	By Product	Toluene
		Nickel	Catalyst	Raney Nickel Hydrogenation Catalyst
Hydrogenation	Propionitrile	Propionitrile	Product	Propane nitrile
		Acrylonitrile	Raw Material	2-Propene nitrile
		Hydrogen	Raw Material	Hydrogen
		Nickel	Catalyst	Raney Nickel Hydrogenation Catalyst
General	Ethoxy Propionitrile	Ethoxy Propionitrile	Product	Ethoxy Propionitrile
		Acrylonitrile	Raw Material	Acrylonitrile
		Ethyl Alcohol	Raw Material	Ethyl Alcohol

TABLE 2 (cont)

Type Reaction	Final Product	Compound	Designation	Chemical Name
General	Krenite	Krenite	Product	Ammonium ethyl carbamoylphosphonate
		Xylene	Solvent	Xylene
		Triethyl Phosphite	Raw Material	Triethyl phosphite
		Methyl Chloroformate	Raw Material	Methyl Chloroformate
		Ammonia	Raw Material	Ammonia
		Ethyl Chloride	By Product	Ethyl Chloride
		Ethyl Alcohol	By Product	Ethyl Alcohol
		Methyl Alcohol	By Product	Methyl Alchol
		Lignosol DXD	Color Agent	Sodium Lignosulfonate
General	Dipropylene Glycol Dibenzoate	Dipropylene Glycol Dibenzoate	Product	Dipropylene Glycol Dibenzene
		Dipropylene Glycol	Raw Material	Dipropylene Glycol
		Benzoic Acid	Raw Material	Benzoic Acid
General	Methoxy Propionitrile	Methoxy Propionitrile	Product	Methoxy Propionitrile
		Acrylonitrile	Raw Material	Acrylonitrile
		Methyl Alcohol	Raw Material	Methyl Alcohol
General	Dinonyl Phenyl Hydrogen Phosphite	Dinonyl Phenyl Hydrogen Phosphite	Product	Dinonyl Phenyl Hydrogen Phosphite
		Nonyl Phenol	Raw Material	Nonyl Phenol
		Phosphorous Trichloride	Raw Material	Phophorus Trichloride
General	MA-1	MA-1	Product	MA-1
		Methyl Methacrylate	Raw Material	Methyl Methacrylate
		N,N-Dimethanolamine	Raw Material	N,N-Dimethanolamine
		Methyl Alcohol	By Product	Methyl Alcohol
General	MA-1Q	MA-1Q	Product	MA-1Q
		MA-1	Raw Material	MA-1
		Dimethyl Sulfate	Raw Material	Dimethyl Sulfate

Table 3
Ranges of Contaminants of Concern
Kalama Site

Contaminants of Concern	Soil (mg/kg)	Groundwater (ug/L)	Surface Water (ug/L)	Sediment (mg/kg)
		ON-SITE		
Benzene	ND-19	ND-1,000	ND-78	ND-1.5
Carbon Tetrachloride	ND	ND	ND	ND-0.64
1,2-Dichloroethane	ND-1.9	ND-13,000	ND-640	ND-3.1
1,1-Dichloroethylene	ND	ND-420	ND	ND-0.96
Ethylbenzene	ND-1,800E	ND-1,300	ND-61	ND-5.3
Methylene chloride	ND-41	ND-670B	ND-170B	ND-1.1
Vinyl chloride	ND	ND	ND	ND-2
Lead	ND-494	ND	ND-87.9	8.39-11,394
Mercury	ND-94.68	ND-4.7	ND-1.03	ND-0.45
Sodium	0.06-387	4,000-90,300	ND-15,900	38.1-1,096
		OFF-SITE		
Benzene		ND	ND	ND
Carbon Tetrachloride		ND	ND	ND
1,2-Dichloroethane		ND-31	ND	ND
1,1-Dichloroethylene		ND	ND	ND
Ethylbenzene		ND	ND	ND-10
Methylene chloride		0.9BJ-14B	ND	ND-2BJ
Vinyl chloride		ND	ND	ND
Lead		ND-5.0	ND-29.9	3.7-76.6
Mercury		ND-0.51	ND	0.02-0.14
Sodium		3,100B-106,800	4,100-8,200	

B-Also detected in associated laboratory blank
E-Estimated value out of detection range
J-Estimated value lower than detection limit

mg/kg-Milligram per kilogram
ug/L-Microgram per liter
ND-Not detected

Table 4
Exposure Pathway
Kalama Site

Exposure Pathway	Time	Source	Media & Transport	Point of Exposure	Route of Exposure	Exposed Population
Soil (Potential)	Present Future	Kalama Site	Soil	Kalama Site	Ingestion	People Who Access the Site
Sediment (Potential)	Present Future	Ditch	Sediment in Ditch	Ditch	Ingestion	People Who Fall into the Ditch
Private Well (Potential)	Present Future	Private Well (CW)	Ground-Water	Private Well (CW)	Inhalation & Skin Contact	People Using Water from CW Well
Ditch Water (Potential)	Present Future	Ditch	Surface Water	Ditch	Inhalation & Skin Contact	People Fall & Children Play in the Ditch